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gion and the like, in which the chief deceiver is the observer's own self; here belong the cases of witchcraft and the cheap miracles of modern séances. For this kind of false perception the only help is prevention, the cultivation of sound and independent habits of mind, and a knowledge of when consciousness is likely to be an unreliable witness.

Statistische Untersuchungen über Träume und Schlaf. FRIEDRICH HEERWAGEN. Wundt's Philos. Studien, V, 2.

In order to answer the question, "Do people who dream much have lighter or sounder sleep than the average," a series of questions were asked of 142 women, 151 students, and 113 men of various occupations. Of these, 99 dream all night long, 133 often and 153 seldom, the remainder never; 216 have vivid and 175 not vivid dreams; 194 can easily recall the dreams, and 203 have difficulty in recalling them. 10.30 is the average time of retiring, and 0-3 hours are the extremes of the time needed to fall asleep. 261 sleep all night uninterruptedly and 143 have waking spells. 166 are heavy sleepers, 202 are light. 103 can sleep at will during the day (after-dinner naps not counted); 182 find the forenoon best for mental labor, 133 the evening, the balance are indifferent. 132 are of sanguine temperament, 70 are choleric, and 74 are phlegmatic; 20 are melancholic, the others are mixed.

These statistics serve to give an idea of the nature of the questions asked. The results were tabulated and the following laws deduced: Sleep is soundest in childhood, and becomes increasingly lighter with age. Dreaming reaches its maximum intensity and frequency at an age of 20-25 years, the increase from childhood and the decrease toward senescence being gradual.

The following factors are in close relation and vary together: Vividness of dreams, frequency of dreaming, lightness of sleep, power of recall, length of sleep or the number of hours needed, nervous or anti-phlegmatic temperament. Women dream more than men, and students stand as a class between other men and the women. Married women dream less than the unmarried. The deeper the sleep the easier it is to do mental work in the morning. A medium length of time required for falling asleep is connected with frequent dreams and light sleep. Men sleep most soundly and women least so. Those whose sleep is most interrupted also sleep most by day. Some who on rising feel weary rapidly regain vigor. There are, however, individual exceptions to all the above rules, as when frequent dreaming is connected with deep sleep; the stimulus that wakes a person up is provocation of a dream in this case. We must also remember that the curve of depth of sleep is lowest in the morning when dreaming is most frequent.

J. N.

Earthquake Effects, Emotional and Moral. JOHN MILNE. Trans. Seismological Soc. of Japan, Vol. XI.

Note on the Effects produced by Earthquakes upon the Lower Animals. JOHN MILNE. Trans. Seismological Soc. of Japan, Vol. XII.

In the first paper the author adds to a few general observations on the physical and moral effects of earthquakes, a number of extracts from miscellaneous sources, showing the state of mind into which men are thrown by such calamities, and finally traces some possible

effects (but by no means all of them certain) upon national character. The most tangible are the creation of earthquake gods or monsters, and the introduction of their cults. In the second paper the question of animal foreknowledge of such phenomena is discussed. When the animal's agitation precedes the shock by some time it has nothing to do with it, but when by only a half minute or less the animal may feel the fainter ripples that run before the main waves in heavy earthquakes. Under favorable circumstances the shock may thus be anticipated as much as 10 or 15 seconds by human observers.

Vollständiges Lehrbuch der Gedächtniskunst. ADOLF KÜHNE. Osterwieck, Harz.

Die Gedächtniskunst im Dienste des Lehrenden und Lernenden. J. FIEWEGER. Breslau, 1888.

A. Kühne bases his art upon the laws of association and the principle that the learner should proceed from the known to the unknown. He approves what Kant called the *judiciöse* method in mnemonics, and maintains that without the help of the understanding the memory is always weak and untrustworthy. He adopts a figure alphabet, associates the fact to be remembered with the mnemonic word after the fashion of some of the older mnemonic teachers, and applies his principles chiefly to the learning of dates, tables and the like.

J. Fieweger gives many illustrations of the application of the older principles of the mnemonic art in learning difficult tasks. Such books are chiefly interesting psychologically as showing the cumbersome devices that some people find helpful for forcing the attention to disagreeable things.

W. H. B.

Beiträge zur Kenntniss der Physiologie und Biologie der Protozoen.
Bericht der naturforschenden Gesellschaft zu Freiburg, Vol. I, 1886.

This paper is of great psychological as well as of biological interest. It was found that when these unicellular organisms (*Stentor*, *Amoeba*, etc.) were artificially cut up, that the part cut off was restored to its perfect form by regeneration, no matter what was the portion of the cell that was lost; so that when the cell was divided two or more times into approximately equal parts, each part restored itself to the perfect animal. It was found that no portion would thus restore itself unless it possessed a fragment of the nucleus (which in *Stentor* is a long-headed filament). The conclusion is plain, viz. that any portion of the nucleus possesses protoplasm which has the complete characters of the entire being, and which controls the nutrition of the extra-nuclear protoplasm. That is, the molecules of the nucleus are *idioplasm*, and each is like the others, and in itself is capable of restoring the entire cell. These idioplasm molecules may of course be different from chemical molecules; experiments throw no light on that. Partial or incomplete division leads to the formation of individuals that remain united by the part left uncut. Studies of the spontaneous fission of these forms revealed that the daughter-cells of one form divided together, although separated into different watch-crystals and in different sorts of water. This same synchronism of reproductive activity of protoplasm closely related, was observed in the artificial sections, even when these differed greatly as to size.

J. N.